
CHAPTER IV E

Sutter National Wildlife Refuge Alternative Plans



**U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION**

CHAPTER IV E

SUTTER NATIONAL WILDLIFE REFUGE

Sutter National Wildlife Refuge (Refuge) was established in 1944 under the Lea Act which authorized and appropriated funds for the purchase of land for migratory waterfowl in the Sacramento Valley. The Refuge was originally established to reduce crop losses due to waterfowl. Additional lands were acquired in 1953 and 1956 with funds provided by the Duck Stamp Act. The Refuge is managed by the Service and is located in Sutter County eight miles southwest of Yuba City. Most of the Refuge is within the Sutter Bypass, north of the confluence with the Tisdale Bypass, as shown in Figure IV E-1. The Refuge is the only publicly-owned wildlife management area in the Sutter Basin.

Sutter Basin extends from the Sutter Buttes on the north to the confluence of the Feather and Sacramento Rivers. The basin drains north to south. Historically, flood flows from the Sacramento River, Butte Sink, and Feather River have inundated large portions of the 57,000-acre Sutter Basin year-round. However, most of the land has since been developed for agricultural uses. Most of the rice fields are also used as private hunting clubs.

The Refuge consists of ponds, moist soil plant and millet fields, and uplands. The natural ponds support sources of waterfowl food such as swamp timothy and invertebrate populations. Moist soil plants and millet are raised for waterfowl food. The upland areas of the Refuge provide habitat for geese, upland birds, and other wildlife species.

A. WATER RESOURCES

The Refuge receives water from the East and West Borrow Ditches in the Sutter Bypass and the Sutter Extension Water District.

1. Surface Waters

Surface water supplies for the Refuge are provided through the Sutter Bypass or from Thermalito Afterbay via the Sutter-Butte Canal or Butte Creek. Over 85 percent of the water supply for the Refuge is obtained from the East and West Borrow Ditches of the Sutter Bypass. During the irrigation season, most of the water in the Bypass is agricultural return flows. Flood flows are conveyed in the Bypass during the winter.

The Refuge holds three water rights in the Bypass. License 4590, obtained in 1946 with Priority No. 24, allocates 25 cfs from June 1 to October 30 to be diverted from the East Borrow Pit for irrigation of 1000 acres inside of the Bypass. License 3149, obtained in 1946 with Priority No. 25, appropriates 5 cfs from April 15 to October 1 to be diverted from the East Borrow Pit for

irrigation of 270 acres inside of the Bypass. License 6996, obtained in 1957, appropriates 10 cfs of water from the main drainage canal on the east side of the East Sutter Bypass levee between October 1 and January 1 for irrigation of 450 acres. These water rights do not have a high priority number. Therefore, only surplus water is available to the Refuge. Due to the lack of available water during most of the the year, these sources cannot be considered to be dependable water sources. The water right under License 6996 is not used due to poor water quality and limited availability.

Water has been purchased by the Refuge and cooperative farmers from Sutter Extension Water District for portions of the Refuge located outside of the Sutter Bypass (Tracts 18, 19, and 20). The Sutter Extension Water District is a member of the Sutter-Butte Joint Water District which owns and operates the Sutter-Butte Canal that conveys water from the Thermalito Afterbay.

The Western Canal Water Users Association (WCWUA) was formed in 1985 when the PG&E canal facilities were purchased. The WCWUA canal facilities divert water from Thermalito Afterbay and are operated year-round to deliver water to duck clubs in the Butte Sink. The WCWUA could convey water to Butte Creek for conveyance to the Sutter Bypass. However, the additional water in Butte Creek could be illegally diverted upstream of the Refuge.

Another potential source of water is the Oroville-Wyandotte Irrigation District which obtains water from the Thermalito Afterbay. The water could be conveyed through the Sutter-Butte Joint Water District facilities.

2. Water Conveyance Facilities

The east channel of the Sutter Bypass, or the East Borrow Pit, provides most of the water to the Refuge. Water flows by gravity through the DWR Weir Number 2 which allows gravity flooding via the Refuge's main canal to most of the southern portion of the Refuge. Water for the northern portion of the Refuge is pumped from the Refuge's main canal at the north end of the Refuge. A replacement weir structure has been proposed by the DWR which would be one-foot lower than the existing weir. Therefore, the Refuge pumping costs would be increased. Water also is diverted from the West Borrow Pit at a dam near the southwest corner of the Refuge.

Water is pumped from the Sutter Extension Water District Lateral F2 to serve portions of the Refuge outside of the Sutter Bypass.

3. Groundwater

The Refuge is located along the margin of the Sacramento River flood basin deposits and the low alluvial plain deposits of streams that drain the Sierra Nevada Mountains. Two aquifers of different quality occur under the Refuge. High quality water is located at

depths of 100 to 350 feet. Water with high specific conductivities is located at depths of 350 to 750 feet. If the better quality water is pumped at high rates, the water with the high specific conductivities may rise and contaminate the good quality water.

The best well production is anticipated to occur in the southwestern corner of the Refuge which is underlain by deep lenses of sand and gravel. In this area, high quality groundwater is located within 200 feet of the ground surface. The average discharge rate for pumps in the southwestern portion of the Refuge is estimated to be 2,500 gpm.

The Refuge has four wells which could be used to supplement water flows in a conjunctive use program. The pumping capacity of the wells range from 1,800 to 3,000 gpm. The groundwater quality is good for irrigation and wildlife uses. A deep well is used by the areas outside of the Sutter Bypass (Tracts 18, 19, and 20) when water is not available from Sutter Extension Water District. The safe yield of the aquifer under the Refuge has been estimated by Reclamation to be 3,110 acre-feet.

B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

The Service estimates that 30,000 acre-feet of water would be required for full development and optimum management of the entire Refuge. For the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified, as presented in Table IV E-1. Each of the water supply levels provide a different volume of water and are summarized as follows:

Level 1 - Existing firm water supply

Level 2 - Current average annual water deliveries

Level 3 - Water supply needed for full use of existing development

Level 4 - Water delivery needed for optimum management

1. Delivery Alternative for Level 1 (No Action Alternative) (0 acre-feet)

The Refuge does not have a firm water supply; therefore, no facilities were considered.

2. Delivery Alternatives for Level 2 (23,500 acre-feet)

This level of water delivery represents the current average water delivery. Although existing facilities are capable of transporting flows from the East and West Borrow Ditches and through the Sutter Extension Water District, these current water supplies are not considered to be dependable water supplies. The following alternatives have been developed to improve the

TABLE IV E-1

DEPENDABLE WATER SUPPLY NEEDS

ALTERNATIVE SUPPLY LEVELS FOR THE SUTTER NWR

Month	<u>Supply Level 1</u> ac-ft	<u>Supply Level 2</u> ac-ft	<u>Supply Level 3</u> ac-ft	<u>Supply Level 4</u> ac-ft
January	0	950	1,200	1,200
February	0	1,000	1,300	1,300
March	0	1,000	1,300	1,300
April	0	950	1,200	1,200
May	0	1,100	1,440	1,440
June	0	1,300	1,680	1,680
July	0	1,300	1,680	1,680
August	0	3,800	4,800	4,800
September	0	4,500	5,800	5,800
October	0	3,800	4,800	4,800
November	0	1,900	2,400	2,400
December	0	1,900	2,400	2,400
Total	0	23,500	30,000	30,000

Notes:

Supply Level 1 Existing firm water supply
 Supply Level 2 Current average annual water deliveries
 Supply Level 3 Full use of existing development
 Supply Level 4 Optimum management

Source: USBR, 1986a; USFWS, 1986d

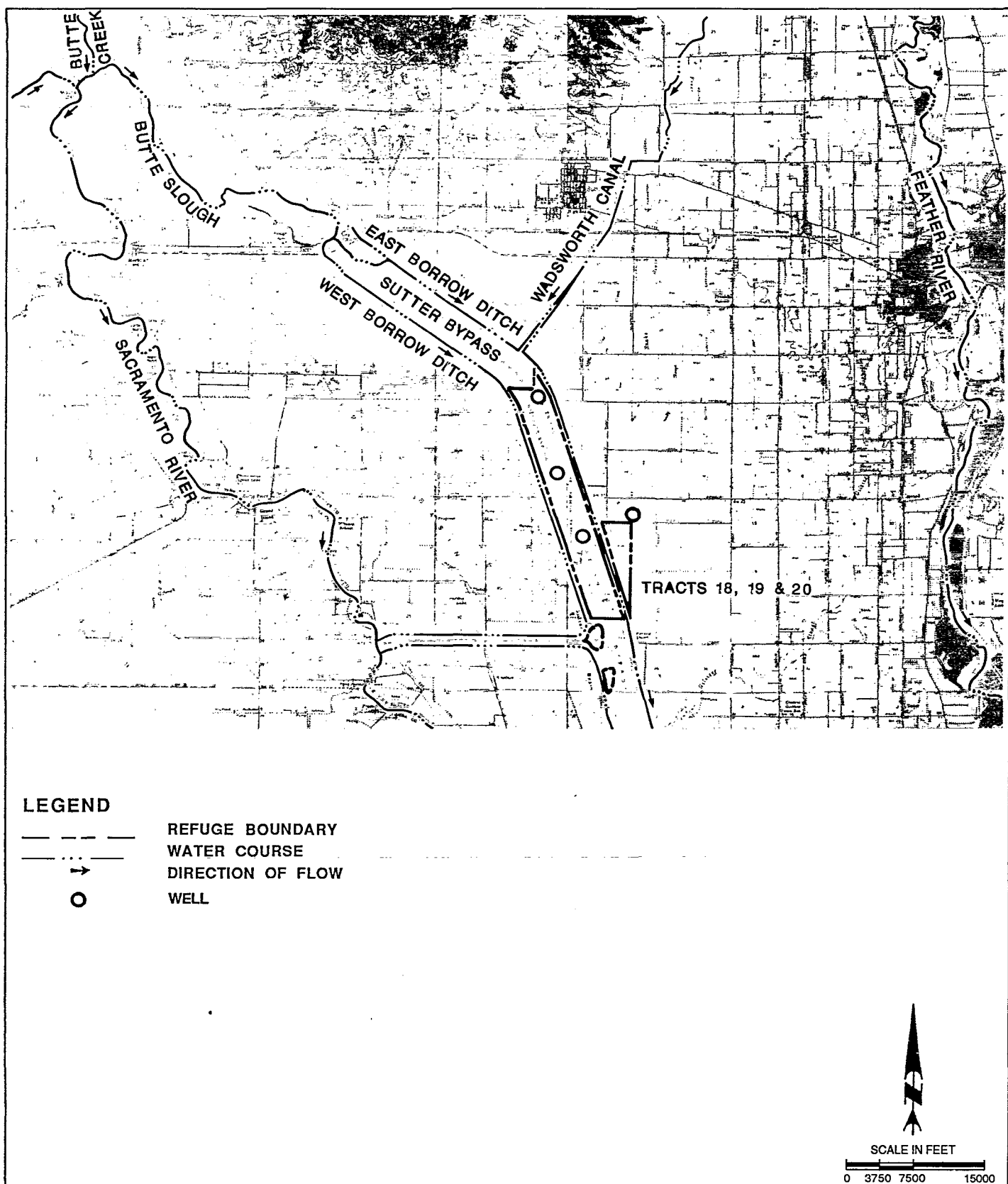


FIGURE IV E-1

SUTTER NATIONAL WILDLIFE REFUGE

EXISTING WATER SUPPLY FACILITIES

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reliability and quality of water provided to the Refuge. These alternatives assume that a long-term agreement will be negotiated between DWR and Reclamation to exchange CVP water for water from Thermalito Afterbay.

Alternative 2A - Deliver Water from Thermalito Afterbay through Butte Creek. Water from Thermalito Afterbay or Oroville-Wyandotte Irrigation District would be delivered by the WCWUA to Butte Creek. The water would flow down Butte Creek and Butte Slough, as shown in Figure IV E-2, to the Sutter Bypass and would be diverted from the East and West Borrow Ditches. Both of these systems would have adequate capacity to convey water to the Refuge. During this study, the WCWUA indicated that the maintenance shutdown period could be reduced to allow water delivery to the Refuge. This conveyance plan was used during the 1977 drought period to convey water to the Refuge. Illegal upstream diversions may occur under this alternative.

Alternative 2B - Deliver Water from Thermalito Afterbay through Wadsworth Canal. Water would be conveyed directly from the Thermalito Afterbay to the Wadsworth Canal, or from Thermalito Afterbay through the Sutter-Butte Canal to the Wadsworth Canal. Water would flow from the Wadsworth Canal into the Sutter Bypass and would be diverted from the East Borrow Ditch. Adequate capacity is available for conveyance of water to the main portion Refuge which is located within the Sutter Bypass. Sutter-Butte Canal and Wadsworth Canal are operated by Sutter Extension Water District, a member of Sutter-Butte Joint Water District. Illegal upstream diversions may occur under this alternative.

Alternative 2C - Obtain Water from Sutter Extension Water District. A long-term agreement with Sutter Extension Water District would be developed to provide a dependable water supply for areas of the Refuge located outside of the Sutter Bypass (Tracts 18, 19, and 20). The water supply for these tracts is currently being provided by Sutter Extension Water District on an as-available basis. Water would be supplied to the remaining portions of the Refuge as described under Alternative 2B.

Alternative 2D - Implement a Conjunctive Use Plan. The existing four wells and nine new wells would be used to deliver the maximum month water demand. The exact locations of the new wells on the refuge would be determined in a future study. The wells would be used as part of a conjunctive use program. During dry years, water demands would be supplied by wells, as discussed in Chapter III. During wet years, the wells would probably not be needed if CVP water is provided. This alternative would require implementation of Alternative 2A, 2B, or 2C.

3. Delivery Alternatives for Level 3 (30,000 acre-feet)

Water deliveries under Level 3 are similar to the Level 2 deliveries. The same alternatives considered for Level 2 were evaluated for Level 3.

Alternative 3A - Deliver Water from Thermalito Afterbay through Butte Creek. This alternative is identical to Alternative 2A.

Alternative 3B - Deliver Water from Thermalito Afterbay through Wadsworth Canal. This alternative is identical to Alternative 2B.

Alternative 3C - Obtain Water from Sutter Extension Water District. This alternative is identical to Alternative 2C.

Alternative 3D - Implement a Conjunctive Use Plan. The existing 4 wells and 15 new wells would be used to deliver the maximum month water demand. This alternative is similar to Alternative 2D and would require implementation of Alternative 3A, 3B, or 3C.

4. Delivery Alternatives for Level 4 (30,000 acre-feet)

The water deliveries under Level 4 would be equal to the deliveries under Level 3. Therefore, the alternatives for Level 4 would be the same as discussed under Levels 2 and 3.

Alternative 4A - Deliver Water from Thermalito Afterbay through Butte Creek. This alternative is identical to Alternative 3A.

Alternative 4B - Deliver Water from Thermalito Afterbay through Wadsworth Canal. This alternative is identical to Alternative 3B.

Alternative 4C - Obtain Water from Sutter Extension Water District. This alternative is identical to Alternative 3C.

Alternative 4D - Implement a Conjunctive Use Plan. The existing wells and 15 new wells would be used to deliver the maximum month water demand. This alternative is identical to Alternative 3D and would require implementation of Alternative 4A, 4B, or 4C.

5. Summary of Alternatives

The beneficial and adverse effects of each alternative were compared with respect to the criteria listed in Chapter III.

There are no alternatives for Level 1 because the Refuge does not have a firm water supply.

The alternatives were developed to provide a dependable summer and winter supply of good quality water to the Refuge. All of the alternatives were developed assuming that a long-term agreement would be negotiated between DWR and Reclamation to allow an exchange

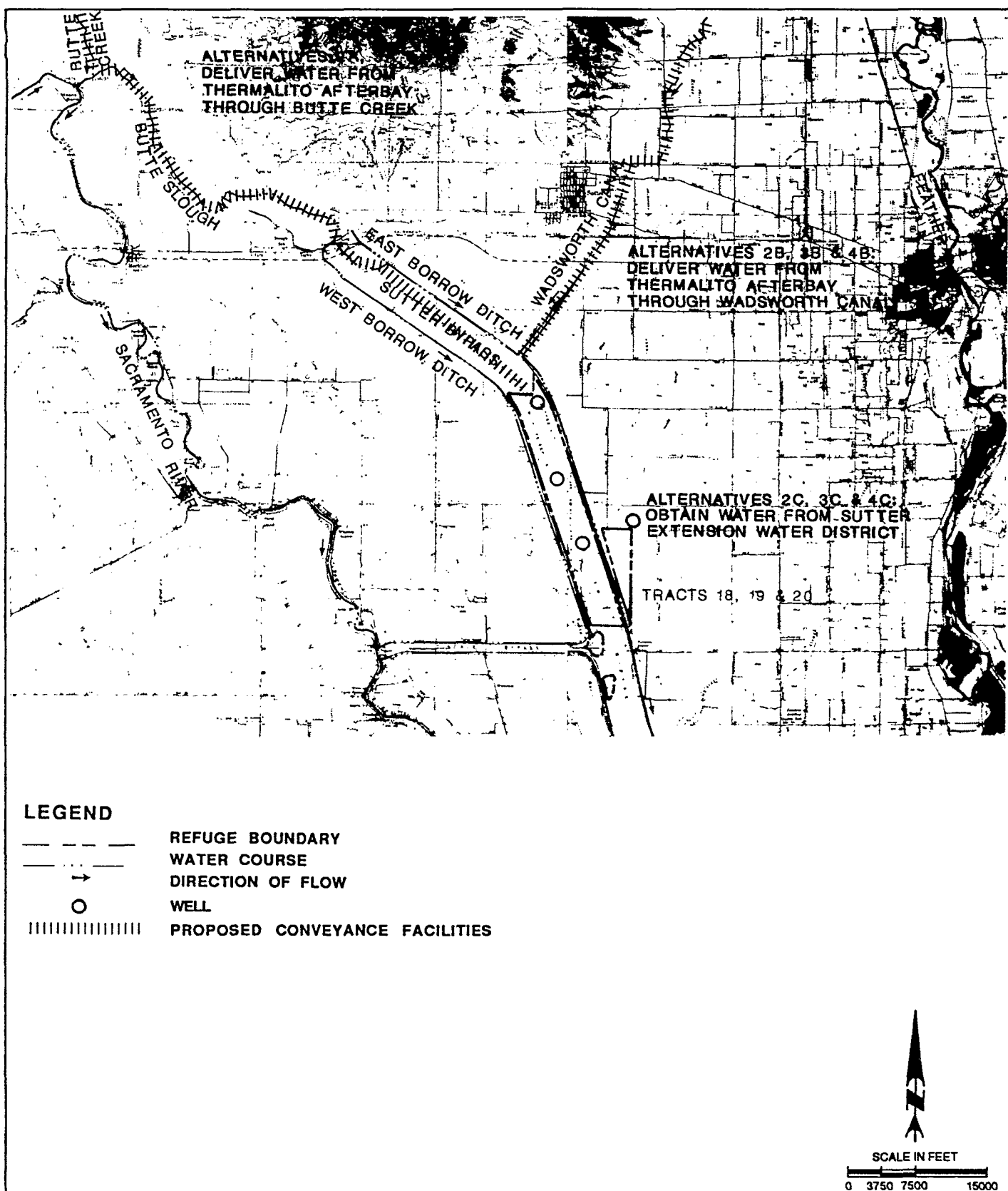


FIGURE IV E-2

SUTTER NATIONAL WILDLIFE REFUGE

ALTERNATIVE WATER SUPPLY FACILITIES

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of CVP water for SWP water from the Thermalito Afterbay. Alternatives 2A, 3A, and 4A would require long-term conveyance agreements with WCWUA. Alternatives 2B, 3B, and 4B would require long-term agreements with the Sutter-Butte Joint Water District and Sutter Extension Water District. Alternatives 2C, 3C, and 4C would require long-term agreements with Sutter Extension Water District. None of the alternatives would require construction of additional facilities.

Alternatives 2C, 3C, and 4C would need to be implemented in conjunction with Alternatives 2A or 2B, 3A or 3B, or 4A or 4B, respectively.

Alternatives 2D, 3D, and 4D would provide wells to be used during dry years when CVP water may not be available. This alternative may cause overdraft conditions because the water needs would exceed the safe yield under the Refuge. These alternatives would require implementation of the surface water alternatives (Alternatives 2A, 2B, or 2C; Alternatives 3A, 3B, or 3C; or Alternatives 4A, 4B, or 4C).

C. COSTS & ECONOMIC ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Levels 2, 3, and 4 are presented in Table IV E-2. Annual operation and maintenance (O&M) costs include only the local cost of delivering water. The annual O&M costs do not include costs to purchase CVP water. The construction costs include factors to cover engineering, contingencies, and overhead. During the advanced planning phase, these costs will be refined further.

Construction of the facilities under Alternatives 2D, 3D, and 4D would result in additional money being spent in the economy of Sutter County. The construction could be completed within one summer season by construction workers who reside in the area.

Currently, the annual public use (Level 2) at the Refuge is about 3,100 visits per year. If additional water is provided, the public use levels are not anticipated to increase significantly.

D. WILDLIFE RESOURCES

The average annual bird use on the Refuge is over 15,817,000. Wildlife and fishery resources associated with the Refuge are presented in Table IV E-3. The only listed threatened and endangered species associated with the Refuge are the bald eagle, Haliaeetus leucorhynchus; peregrine falcon, Falco peregrinus anatum; Aleutian Canada goose, Branta canadensis leucopareia; and the Valley elderberry longhorn beetle, Desmocerus californicus dimorphus. Candidate threatened and endangered species associated with the Refuge include the white-

TABLE IV E-2
SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES
SUTTER NWR

Items	Alternatives							
	2A	2B	2C	2D	3A & 4A	3B & 4B	3C & 4C	3D & 4D
Additional Water (ac-ft)	23,500	23,500	23,500	23,500	30,000	30,000	30,000	30,000
Construction Costs								
Wells	\$ --	\$ --	\$ --	\$672,750 ^(a)	\$ --	\$ --	\$ --	\$1,121,250 ^(b)
Diversion	--	--	--	--	--	--	--	--
Pipelines/Canals	--	--	--	--	--	--	--	--
Pump Station	--	--	--	--	--	--	--	--
Subtotal	--	--	--	\$672,750	--	--	--	\$1,121,250
Other Costs	--	--	--	--	--	--	--	--
Total	--	--	--	\$672,750	--	--	--	\$1,121,250
Annualized Construction Costs (8.87%, 30 yrs)	--	--	--	\$ 64,720	--	--	--	\$ 107,870
Additional Annual Costs								
Operation & Maintenance ^(c)	\$ --	\$ --	\$ --	\$ 22,900	\$ --	\$ --	\$ --	\$ 38,100
Power	--	--	--	293,750 ^(d,e)	--	--	--	375,000 ^(d,e)
Local Conveyance Cost ^(f)	105,750	105,750	105,750	--	135,000	135,000	135,000	--
Subtotal	\$105,750	\$105,750	\$105,750	\$316,650	\$135,000	\$135,000	\$135,000	\$ 413,100
Other Costs	--	--	--	52,875 ^(e,g)	--	--	--	67,500 ^(e,g)
Total	\$105,750	\$105,750	\$105,750	\$369,525	\$135,000	\$135,000	\$135,000	\$ 480,600
Total Annual Costs	\$105,750	\$105,750	\$105,750	\$434,245	\$135,000	\$135,500	\$135,000	\$ 588,470
Cost/Additional Acre-Foot	\$ 4.50	\$ 4.50	\$ 4.50	\$ 18.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 19.60

TABLE IV E-2
SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES
SUTTER NWR
(Continued)

Notes: Alternatives 2A, 3A, and 4A - Deliver water from Thermalito Afterbay through Butte Creek.
Alternatives 2B, 3B, and 4B - Delivery water from Thermalito Afterbay through Wadsworth Canal.
Alternatives 2C, 3C, and 4C - Obtain Water from Sutter Extension Water District.
Alternatives 2D, 3D, and 4D - Implement a Conjective Use Plan.

- (a) 9 wells, 750-feet deep, 150-foot lift.
- (b) 15 wells, 750-feet deep, 150-foot lift.
- (c) Basis for O&M costs are discussed in Appendix F.
- (d) Unit Pumping Cost = \$25/af.
- (e) Values were multiplied by 0.5 because facilities are assumed to be used only 5 out of 10 years.
- (f) Unit Conveyance Cost = \$4.50/af.
- (g) Alternative 2D assumes implementation of Alternative 2A, 2B, or 2C; Alternative 3D assumes implementation of Alternative 3A, 3B, or 3C; and Alternative 4D assumes implementation of 4A, 4B, or 4C.

TABLE IV E-3

FISH AND WILDLIFE RESOURCES

SUTTER NWR

Ducks

Hooded Merganser	Blue Winged Teal(a)	Ring Necked Duck
Mallard(a)	Northern Shoveler(a)	Common Goldeneye
Gadwall(a)	Pintail(a)	Greater Scaup
European Wigeon	Wood Duck(a)	Lesser Scaup
American Wigeon	Redhead(a)	Buffle Head
Green-winged Teal(a)	Canvasback	Common Merganser(a)
Cinnamon Teal(a)	Ruddy Duck(a)	

Geese and Swans

Snow Goose	White-fronted Goose	Cackling Goose
Ross' Goose	Canada Goose	Lesser Canada Goose
		Tundra Swan

Coots

American Coot(a)

Shore and Wading Birds

Western Grebe(a)	Virginia Rail(a)	Common Snipe
Eared Grebe	Sora(a)	Long-billed Dowitcher
Pied-billed Grebe(a)	Common Gallinule(a)	Least Sandpiper
Double-crested Cormorant	Ring-billed Gull	Dunlin
White Pelican	Caspian Tern(a)	Western Sandpiper
American Bittern(a)	Forester's Tern	Greater Yellowlegs
Least Bittern(a)	Black Tern(a)	Long-billed Curlew
Great Blue Heron(a)	Wilson's Phalarope	Killdeer(a)
Great (common) Egret(a)	American Avocet	Black-crowned Night Heron(a)
Snowy Egret(a)	Black-Necked Stilt	Greater Sandhill Crane
Green-backed Heron(a)		

TABLE IV E-3
FISH AND RESOURCES

SUTTER NWR
(Continued)

Upland Game

Ringed-necked Pheasant^(a)
California Quail^(a)

Rock Dove

Mourning Dove^(a)

Raptorial Birds

Turkey Vulture
Sharp-shinned Hawk^(a)
Rough-legged Hawk
Great Horned Owl^(a)
Bald Eagle

Black-shouldered Kite^(a)
Cooper's Hawk^(a)
American Kestrel^(a)
Red Shouldered Hawk^(a)

Northern Harrier
Red-tailed Hawk^(a)
Barn Owl^(a)
Golden Eagle
Peregrine Falcon

Fish

Steelhead Trout
Catfish

Salmon
Black Crappie

Largemouth Bass

Furbearers

Opossum
Raccoon
Skunk

Gray Fox
Beaver
Muskrat

Coyote
Mink

Others

Black-tailed Deer

Notes:

(a) Birds nesting on refuge

Source: USFWS computerized annual printout for NWR Birds, Department of Interior, USFWS (RF11650-2 9-79) (July 1973 to June 1974, NWRS Public Use Report (1)) and refuge records.

faced ibis, Plegadis chichi; tricolored blackbird, Agelaius tricolor; and California hibiscus, Hibiscus californicus, as listed in Table IV E-4.

The alternative plans would provide a dependable water supply. As all portions of the Refuge have developed water transportation systems, additional water would be used to improve habitat rather than to develop additional wetlands. The improved habitat would increase the number of bird-use days, as indicated in Table IV E-5.

Implementation of alternative plans probably probably would not adversely affect the listed and candidate threatened and endangered species of wildlife. Detailed field investigations will be completed during the advanced planning phase of the project. Implementation of the plan would result in overall beneficial environmental effects. The No Action Alternative would result in the loss of habitat. Additional regional environmental analyses will be completed as part of the Water Contracting EIS's.

E. SOCIAL ANALYSIS

The social consequences of operating the facilities of the selected plans would be positive due to the continued public use.

F. POWER ANALYSIS

The Refuge is served by PG&E under the PA-1 rate schedule for agricultural users. A facility must be an authorized function of the CVP to receive project-use power. The authority to deliver the CVP project-use power to the Refuge is currently being examined and will be detailed in the Refuge Water Supply Planning Report. A more detailed discussion of project-use power and wheeling agreements is provided in Chapter II.

G. PERMITS

To obtain State Water Project water, approvals from DWR would be required. Sutter County would issue permits for construction of the wells under Alternatives 2D, 3D, and 4D.

TABLE IV E-4

FEDERALLY LISTED, PROPOSED, & CANDIDATE, THREATENED & ENDANGERED SPECIES

SUTTER NWR

Listed Species

Birds

Aleutian Canada goose, Branta canadensis leucopareia (E)
Bald Eagle, Haliaeetus leucocephalus (E)
Peregrine Falcon, Falco peregrines anatum (E)

Invertebrates

Valley elderberry longhorn beetle, Desmocerus californicus dimorphus
(T)

Proposed Species

None

Candidate Species

Birds

White-faced ibis, Plegadis chihi (2)
Tricolored blackbird, Agelaius tricolor (2)

Plants

California hibiscus, Hibiscus californicus (2)

Source: USFWS, June 4, 1987

(E)—Endangered

(T)—Threatened

(CH)—Critical Habitat

(1)—Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2)—Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

TABLE IV E-5
WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS
SUTTER NWR

No Action Alternative		Alternatives							
		2A	2B	2C	2D	3A & 4A	3B & 4B	3C & 4C	3D & 4D
Habitat Acres									
Permanent Pond	--	73	73	73	73	85	85	85	85
Seasonal Marsh	--	1,047	1,047	1,047	1,047	1,250	1,250	1,250	1,250
Watergrass	--	865	865	865	865	1,100	1,100	1,100	1,100
Bird Use Days									
Ducks	--	13,203,000	13,203,000	13,203,000	13,203,000	16,200,000	16,200,000	16,200,000	16,200,000
Geese	--	1,432,000	1,432,000	1,432,000	1,432,000	1,760,000	1,760,000	1,760,000	1,760,000
Waterbirds	--	1,182,000	1,182,000	1,182,000	1,182,000	1,450,000	1,450,000	1,450,000	1,450,000
Endangered Species	--	100	100	100	100	100	100	100	100
Total	--	15,817,100	15,817,100	15,817,100	15,817,100	19,410,100	19,410,100	19,410,100	19,410,100
Public Use Days									
Consumptive	--	3,100	3,100	3,100	3,100	3,600	3,600	3,600	3,600
Non-Consumptive	--	--	--	--	--	--	--	--	--
Total	--	3,100	3,100	3,100	3,100	3,600	3,600	3,600	3,600
Total Annual Cost	--	\$ 105,750	\$ 105,750	\$ 105,750	\$ 434,245	\$ 135,000	\$ 135,000	\$ 135,000	\$ 588,470
Incremental Cost/Additional 1000 Bird Use Days	N/A	\$ 6.70	\$ 6.70	\$ 6.70	\$ 27.50	\$ 7.00	\$ 7.00	\$ 7.00	\$ 30.30
Incremental Cost/Additional Public Use Day	N/A	\$ 34.10	\$ 34.10	\$ 34.10	\$ 140.10	\$ 37.50	\$ 37.50	\$ 37.50	\$ 163.50

Notes: Alternatives 2A, 3A and 4A: Deliver Water from Thermalito Afterbay through Butte Creek
 Alternatives 2B, 3B, and 4B: Deliver Water from Thermalito Afterbay through Wadsworth Canal
 Alternatives 2C, 3C, and 4C: Obtain Water from Sutter Extension Water District
 Alternatives 2D, 3D, and 4D: Implement a Conjunctive Use Plan